CLAIMS

What is claimed is:

1. An apparatus for convolving digital samples from a plurality of cable or satellite multimedia signal carriers comprising:

a fast Fourier transform ("FFT") module to transform a plurality of time-based digital samples from each of said signal carriers into a plurality of frequency coefficients;

a multiplier to multiply said plurality of frequency coefficients by a plurality of filter coefficients to produce filtered coefficients in the frequency domain; and

an inverse fast Fourier transform ("IFFT") module to convert said filtered coefficients from the frequency domain into the time domain to produce convolved, time-based digital samples for each of said signal carriers.

2. The apparatus as in claim 1 wherein said FFT employs a round robin policy to process samples from each of said signal carriers in turn.

3. The apparatus as in claim 1 wherein said plurality of signal carriers are a plurality of satellite transponders.

4. The apparatus as in claim 1 wherein said plurality of signal carriers are a plurality of cable carriers.

5. The apparatus as in claim 1 further comprising:

a plurality of tuners to lock on to said signal carriers at specified frequencies and down-convert said signal carriers to baseband signals; and

a plurality of analog-to-digital ("A/D") converters to generate said time-based digital samples from each of said baseband signals.

6. The apparatus as in claim 5 further comprising:

a plurality of anti-alias filters communicatively coupled between each of said tuners and each of said A/D converters.

7. The apparatus as in claim 5 wherein said time-based digital samples are comprised of in-phase ("I") and quadrature ("Q") components.

8. The apparatus as in claim 1 wherein said FFT module transforms said plurality of time-based digital samples using a 50% sample overlap.

9. The apparatus as in claim 1 further comprising:

arbitration logic to control the number of data samples to be processed by said FFT from each signal carrier.

10. The apparatus as in claim 9 wherein said arbitration logic determines said number based on an amount of data samples from each signal carrier stored in said buffers.

11. The apparatus as in claim 1 wherein said FFT discards a specified portion of said frequency coefficients to reduce circular convolution effects.

12. The apparatus as in claim 1 wherein said FFT module is a 384-point FFT module.

13. The apparatus as in claim 12 wherein said IFFT module is a 128-point IFFT module.

14. The apparatus as in claim 1 wherein said FFT module is an N-point FFT module generating N frequency coefficients and wherein said multiplier selects M of said N frequency coefficients to multiply by said filter coefficients.

15. The apparatus as in claim 14 wherein N = 384 and M = 128, thereby generating a 3x decimation of said N frequency coefficients.

16. The apparatus as in claim 1 wherein said multiplier is a complex multiplier and said frequency coefficients are complex frequency coefficients having in-phase ("I") and quadrature ("Q") components.

17. The apparatus as in claim 1 wherein each said signal carrier contains digital samples for a plurality of different multimedia streams.

18. The apparatus as in claim 17 wherein said different multimedia streams are different satellite or cable channels.

19. The apparatus as in claim 17 further comprising a buffer for storing frequency coefficients from each of said time-based digital samples, said multiplier reading said frequency coefficients from said buffer prior to multiplying said coefficients by said filter coefficients.

20. In a system which concurrently processes multimedia data from multiple cable or satellite signal carriers, a method for concurrently convolving said multimedia data comprising:

performing an N-point fast Fourier transform ("FFT") on time-based multimedia data from a first group of signal carriers to generate a set of frequency coefficients representing said first group of signal carriers in the frequency domain;

multiplying said plurality of frequency coefficients by a plurality of filter coefficients to produce filtered coefficients for each multimedia stream in said first group of signal carriers; and

performing an M-point inverse fast Fourier transform ("IFFT") module to convert said filtered coefficients from the frequency domain into the time domain to produce a set of convolved, time-based data samples for each multimedia stream in said first group of signal carriers.

21. The method as in claim 19 further comprising repeating said method for a plurality of additional groups of signal carriers.

22. The method as in claim 20 wherein said first group of signal carriers include all signal carriers locked on to by a particular tuner.

23. The method as in claim 20 wherein said signal carriers are a plurality of satellite transponders.

24. The method as in claim 20 wherein said signal carriers are a plurality of cable carriers.

25. The method as in claim 20 wherein said time-based multimedia data are comprised of in-phase ("I") and quadrature ("Q") components.

26. The method as in claim 20 wherein said FFT module transforms said plurality of time-based multimedia data using a 50% overlap.

27. The method as in claim 20 further comprising:

discarding a specified portion of said frequency coefficients to reduce effects of circular convolution.

28. The method as in claim 20 wherein N = 384 and M = 128.

29. The method as in claim 20 wherein N = 384 and only 128 multimedia data samples are selected by said multiplier to multiply by said filter coefficients.

30. A machine-readable medium having code stored thereon which defines an integrated circuit (IC) for convolving digital samples from a plurality of cable or satellite multimedia signal carriers, said IC comprising:

a fast Fourier transform ("FFT") module to transform a plurality of time-based digital samples from each of said signal carriers into a plurality of frequency coefficients;

a multiplier to multiply said plurality of frequency coefficients by a plurality of filter coefficients to produce filtered coefficients in the frequency domain; and

an inverse fast Fourier transform ("IFFT") module to convert said filtered coefficients from the frequency domain into the time domain to produce convolved, time-based digital samples for each of said signal carriers.

31. The machine-readable medium as in claim 30 wherein said FFT employs a round robin policy to process samples from each of said signal carriers in turn.

32. The machine-readable medium as in claim 30 wherein said plurality of signal carriers are a plurality of satellite transponders.

33. The machine-readable medium as in claim 30 wherein said plurality of signal carriers are a plurality of cable carriers.

34. The machine-readable medium as in claim 30 having additional code defining an IC, said IC further comprising:

a plurality of tuners to lock on to said signal carriers at specified frequencies and down-convert said signal carriers to baseband signals; and

a plurality of analog-to-digital ("A/D") converters to generate said time-based digital samples from each of said baseband signals.

35. The machine-readable medium as in claim 34 having additional code defining an IC, said IC further comprising:

a plurality of anti-alias filters communicatively coupled between each of said tuners and each of said A/D converters.

36. The machine-readable medium as in claim 34 wherein said time-based digital samples are comprised of in-phase ("I") and quadrature ("Q") components.

37. The machine-readable medium as in claim 30 wherein said FFT module transforms said plurality of time-based digital samples using a 50% sample overlap.

38. The machine-readable medium as in claim 30 containing additional code defining an IC, said IC further comprising:

arbitration logic to control the number of data samples to be processed by said FFT from each signal carrier.

39. The machine-readable medium as in claim 38 wherein said arbitration logic determines said number based on an amount of data samples from each signal carrier stored in said buffers.

40. The machine-readable medium as in claim 30 wherein said FFT discards a specified portion of said frequency coefficients to reduce circular convolution effects.

41. The machine-readable medium as in claim 30 wherein said FFT module is a 384-point FFT module.

42. The machine-readable medium as in claim 41 wherein said IFFT module is a 128-point IFFT module.

43. The machine-readable medium as in claim 30 wherein said FFT module is an N-point FFT module generating N frequency coefficients and wherein said multiplier selects M of said N frequency coefficients to multiply by said filter coefficients.

44. The machine-readable medium as in claim 43 wherein N = 384 and M = 128, thereby generating a 3x decimation of said N frequency coefficients.

45. The machine-readable medium as in claim 30 wherein said multiplier is a complex multiplier and said frequency coefficients are complex frequency coefficients having in-phase ("I") and quadrature ("Q") components.

46. The machine-readable medium as in claim 30 wherein each said signal carrier contains digital samples for a plurality of different multimedia streams.

47. The machine-readable medium as in claim 46 wherein said different multimedia streams are different satellite or cable channels.

48. The machine-readable medium as in claim 46 further comprising a buffer for storing frequency coefficients from each of said time-based digital samples, said multiplier reading said frequency coefficients from said buffer prior to multiplying said coefficients by said filter coefficients.